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## The Concept of Multiphasic Screening

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As tests for specific diseases have been perfected, methods have been developed for applying these tests on a mass basis. The chest X-ray for tuberculosis and the serological test for syphilis are typical examples of tests suitable for mass application. Recently a quick and economical method of testing small samples of blood for sugar has been worked out thus making it possible to screen out people in whom the index of suspicion for diabetes is high. In nutrition surveys it has been common practice to determine hemoglobin levels which give some indication of the presence or absence of anemia. Vision and hearing testing is routinely done in school examinations, and in some pre-employment examinations. The taking of blood pressures, a relatively simple procedure, is a common practice in hospitals, physicians' offices, and during physical examinations.

Until recently, mass testing of the population, using the tests and procedures mentioned above, has been limited in many areas to one test or to one procedure. There have been separate mass surveys for tuberculosis, for syphilis, and for nutritional deficiencies. It is perfectly logical now for public health administrators to ask the question, "Why not combine as many of these tests as practical into a battery of tests, reduce the over-all cost of administering them, and thereby encourage universal usage?"

The cost of organizing a community and educating the public to the point where individuals will report for a screening examination should be proportionately less than separately organizing the community for each individual test. A single person may be examined for two, or three, or a half dozen diseases, at one time, thus making it unnecessary to have him report to several different centers at various times for single examinations. This consolidation of testing procedures results in a considerable saving in administrative expense.

Another source of economy in a multiphasic screening program is in the cost of personnel. By multiplying the number of examinations on a single specimen of blood, more examinations may be made in

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a given unit of time by one person than when the number of examinations is limited. If one specimen of blood is examined for evidence of syphilis, diabetes, and anemia, blood has to be drawn only once and only a single specimen has to be examined. The same thing is true of the chest X-ray. It takes only a little more time for the radiologist trained in cardiology and tuberculosis to examine the chest film for evidence of heart disease and lung pathology other than tuberculosis than it does to examine the film for evidence of tuberculosis alone.

By setting up a battery of tests certain personnel may serve double duty. Height and weight may be taken by personnel assisting in the other procedures. One technician may test both for vision and hearing defects. In other words, the duties of a large staff may be arranged in such a way that neither time nor effort is lost.

A contemplated advantage of the multiphasic screening program is that it may be adapted to the resources, in terms of personnel and facilities, that are locally available. When resources are extremely limited, the program may have to be an exceedingly simple one. For example, the multiple testing may be limited to blood examination. These blood screening tests will indicate those in the examining line who should be examined by physicians for syphilis, diabetes, and anemia. If X-ray equipment and technicians are available, a chest X-ray for tuberculosis, heart disease and lung pathology may be added. Or a more elaborate series of tests may be set up with little added expense—a series that would include, in addition to the chest X-ray and blood examination, the taking of height, weight, and blood pressure; vision and hearing testing; and even the determination of intraocular pressure in adults to detect the presence of glaucoma. When local health personnel and facilities are meager or lacking, the detection of early cases of chronic illness is nevertheless valuable in order to delineate the problem.

Multiphasic screening examinations are not intended to screen out of the population every case of diabetes, syphilis, tuberculosis, and the other diseases for which tests are made. It is intended, rather, to screen out in the most economical fashion many thousands of cases that would not otherwise be found. Although for practical purposes a screening test may be a diagnostic test, the whole screening procedure is not intended to result in the actual and immediate diagnosis of disease. It is intended to raise the index of suspicion for a disease so that additional tests will be done. The diagnosis is made or rejected by the private physician or by the diagnostic clinic.

The multiphasic screening program can become very useful in the control of the chronic diseases which, at the moment, are receiving emphasis because of the rapid increase in the size of our popula-

tion. Lacking adequate means of preventing many of the chronic diseases, early diagnosis and early treatment constitute a very effective operation which health departments can undertake in this field. Hypertensives, diagnosed early, can frequently be kept under control by diet therapy. Diabetics can certainly lead a reasonably normal life if found early and placed under adequate medical supervision. The availability of antibiotics for the treatment of syphilis makes the development of the late manifestations of syphilis almost inexcusable. Even cardiacs may be benefited if their cardiac pathology is known and evaluated in time.

The productiveness of a multiphasic screening program can be estimated by a study of prevalence statistics. Based on national estimates, a screening examination of 1,000 apparently well people over the age of 15 for syphilis, diabetes, glaucoma, anemia, tuberculosis, obesity, vision defects, hearing loss, hypertension, and heart disease would result in finding 976 cases of these diseases or pathological physical conditions. Some of the 1,000 people screened probably would have two or more of these diseases or conditions, whereas others would have none. For example, one person might have syphilis and diabetes; another might have a significant refractive error and glaucoma; and still another might be obese and hypertensive.

The distribution of the cases would be as follows: there would be 48 cases of syphilis; 22 cases of diabetes; at least 20 people would have glaucoma (more than 3 percent of the population over 40); 75 would be anemic; 18 or more would have tuberculosis; 200 would be obese; in 266, vision defects would be found; 250 would have a partial hearing loss; hypertension would be present in 38; and at least 39 would have heart disease.

Many of these cases ordinarily may not come to the attention of physicians until definite signs or symptoms have developed. In every community today many people with a chronic disease or a remediable disability, such as faulty vision or a progressive aural disease, are going about their work unaware of the fact that there is anything seriously wrong with them or that they will eventually become hopelessly ill, or permanently disabled. By the time signs and symptoms, which send them to their physician, do develop, much valuable time has been lost and irreversible pathology has been established.

A multiphasic screening program is designed to refer many more persons to physicians for diagnosis and treatment at an earlier stage of their disease than now go of their own volition. These persons will go to physicians not after a chronic illness has rendered them permanently disabled, both economically and physically, but at a time when prompt treatment can assist them to maintain their physical and

economic integrity. This is as important to the physician as it is to the patient.

From the point of view of the taxpayer a multiphasic screening program would be highly desirable. The early detection of persons with a chronic illness makes early treatment possible. This in turn decreases the number of days of hospitalization, and the total amount of medical care required. It therefore lessens the financial burden placed on public agencies that have to provide medical and hospital care for the indigent sick. Another factor of importance is that the prevention of the late complications of chronic illness makes it unnecessary to provide the services of as many able-bodied attendants to care for immobilized patients in hospitals and in the home. The service of these attendants places a heavy financial burden on taxpayers and at the same time makes these attendants unavailable for productive employment.

From the point of view of the health officer, the multiphasic screening program provides an opportunity to increase the quantity of tangible services such as those provided so creditably by the tuberculosis control, venereal disease control, maternal and child health, and other similar programs. Too much that the health department does is hidden from public view. It is not hard for the taxpayer to appreciate the value of a fire department as he watches a fire being extinguished nor the alertness of the police department when a criminal is apprehended. It is far more difficult for the taxpayer to realize that his water supply is protected by the application of complex purification methods; that his milk supply is made safe by pasteurization and by periodic examinations; and that many of the acute infectious diseases have been controlled by the efforts of public health workers and the medical and allied professions.

The multiphasic screening program makes an undeniable appeal to the individual who may be ill, to the physician, to the public health worker, and to the taxpayer. It will foster better teamwork among them all. It will reduce the cost of chronic illness in terms of money and in terms of human misery. There are few communities so devoid of public health, medical and hospital resources, that they cannot support some type of multiphasic screening program. All that is needed is a clear concept of what constitutes a multiphasic screening program and the will to adapt it to local needs.

# Undergraduate Sanitary Engineering Training in the United States

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Studies of undergraduate sanitary engineering training have been made in the past by the Public Health Service (1, 2, 3). The last of these, made by Arthur P. Miller, reported data pertaining to the 1936-1937 school year, and appeared in 1939.

To obtain information on the changes in sanitary engineering education since 1939, a canvass was made in 1946-1947 of American educational institutions offering degree or option courses in sanitary engineering. Letters of inquiry were directed to 36 schools offering such courses. These institutions were listed in a pamphlet entitled, "Employment Opportunities in Public Health" (4). This list and also a list appearing in Engineers' Council for Professional Development (5) are included in appendix I.

Thirty-two of the 37<sup>1</sup> schools originally canvassed submitted catalogs and other pertinent data. Of this number, 22 offered undergraduate sanitary engineering courses and their data were tabulated. Complying with the suggestion that the material be brought up to date and completed, inquiries were again directed to 34 schools offering undergraduate training in sanitary engineering and replies were received from 29. Data had been received in the earlier study from the five institutions that did not reply to this second series of inquiries.

## Subject Matter in Course

The undergraduate sanitary engineering curricula of 29 institutions are summarized in table 1 on the basis of percentage of time allotted to the various subjects in the course. The courses of study have been listed more or less according to subject matter and then combined into the six classifications: cultural, pure science, general engineering, sanitary engineering, public health, and miscellaneous. The percentage of undergraduate time allocated to each of these groups, computed on the basis of the credit hours required for a degree, is included in tables 1, 2, 3, and 4. In the preparation of tables 1 and 2, the Public Health Service pattern of grouping subjects was employed (3). Since pure science courses, such as bacteriology,

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<sup>1</sup> The curriculum of the Newark College of Engineering was included even though this institution is not listed in reference 4. The writer learned that an option in sanitary engineering was to be offered effective 1946-47, and included the proposed sanitary engineering curriculum.

biology, quantitative, organic and physical chemistry, etc., are akin to the work of the sanitary engineer, they are included with the sanitary engineering group of subjects in table 3.

Differences resulting in the percentages of time allocated to each of the groups are shown in the chart. For comparison, the percentage break-down of the various groups comprising the civil engineering course are indicated in the chart and table 4.

## Discussion

Detailed study of tables 1, 2, 3, 4 and the chart indicate the following average conditions:

*Sanitary Engineering* (a)—pure science subjects beyond general chemistry not included as part of sanitary engineering groups of subjects. The data obtained from the 29 undergraduate institutions show the following percent of time allocations in the groups listed.

| Group                     | Percent of Time Allocated |         |         |        |
|---------------------------|---------------------------|---------|---------|--------|
|                           | Average                   | Maximum | Minimum | Median |
| Sanitary engineering..... | 9.4                       | 15.0    | 3.7     | 9.3    |
| Public health.....        | 0.3                       | 2.1     | 0       | 0      |
| Pure science.....         | 29.7                      | 40.4    | 21.7    | 29.0   |
| General engineering.....  | 39.5                      | 54.0    | 21.1    | 41.1   |
| Cultural.....             | 16.3                      | 27.9    | 5.6     | 16.4   |
| Miscellaneous.....        | 4.8                       | 14.5    | 0       | 5.2    |

Approximately 10 percent of the time is devoted to a study of sanitary engineering subjects, 30 percent to pure science subjects, 40 percent to general engineering subjects, 16 percent to cultural subjects and 5 percent to miscellaneous subjects. Wide differences are noted in the various curricula in the ranges indicated by the maximum and minimum values. Sanitary engineering subjects ranged from 3.7 to 15.0 percent. The median, or central value, shows remarkable agreement with the mean or average value.

*Sanitary Engineering* (b)—including all chemistry beyond freshman chemistry, bacteriology, biology, etc. The percent of time allocations on this basis were as follows:

| Group                     | Percent of Time Allocated |         |         |        |
|---------------------------|---------------------------|---------|---------|--------|
|                           | Average                   | Maximum | Minimum | Median |
| Sanitary engineering..... | 14.3                      | 32.0    | 6.7     | 12.1   |
| Public Health.....        | 0.3                       | 2.1     | 0       | 0      |
| Pure science.....         | 24.8                      | 27.9    | 21.4    | 24.6   |
| General engineering.....  | 39.5                      | 54.0    | 21.1    | 41.1   |
| Cultural.....             | 16.3                      | 27.9    | 5.6     | 16.4   |
| Miscellaneous.....        | 4.8                       | 14.5    | 0       | 5.2    |

With the pure science subjects added to the sanitary engineering curriculum, the percent of time allocated to the sanitary engineering group of subjects is increased to approximately 15 percent; the percent of time devoted to pure science subjects is decreased to 25 percent,

**Table 1.** *Percent of time allocated to subjects in undergraduate courses in sanitary engineering in United States engineering colleges, 1946-49*

[illegible]

<sup>1</sup> Sanitary engineering course discontinued.

<sup>2</sup> No sanitary engineering course.

<sup>2</sup> Sanitary engineering option discontinued—5-year engineering course.

<sup>4</sup> Graduate only.

<sup>5</sup> No sanitary option.

- Introduction to civil engineering.
- Includes hydrology.
- Bacteriological examination of water.
- Technical electives.
- Humanities.

er. <sup>dd</sup> Accounting.  
<sup>ee</sup> Engineering society.  
<sup>ff</sup> Foundations.  
<sup>gg</sup> Includes 1.3% for structural drafting  
<sup>hh</sup> Includes 0.7% for substructures.

**Table 2. Percentage of time allocated to various groups of subjects—sanitary engineering (a)**

| School   | Sanitary<br>engi-<br>neering | Public<br>health | Pure<br>science* | General<br>engi-<br>neering | Cultural | Miscel-<br>laneous |
|--|------------------------------|------------------|------------------|-----------------------------|----------|--------------------|
| 1. Alabama University.....                     | 7.7                          | 2.1              | 29.1             | 35.5                        | 23.1     | 2.6                |
| 2. California University.....                  | 12.6                         |                  | 34.8             | 39.3                        | 7.4      | 5.9                |
| 6. Georgia Institute of Technology.....        | 10.3                         |                  | 34.7             | 33.1                        | 14.5     | 7.4                |
| 8. Illinois University.....                    | 9.0                          |                  | 35.4             | 44.4                        | 5.6      | 5.6                |
| 9. Iowa State University.....                  | 11.0                         |                  | 26.2             | 48.3                        | 11.7     | 2.8                |
| 11. Kansas University.....                     | 8.5                          | 1.4              | 31.2             | 44.0                        | 14.9     |                    |
| 12. Kentucky University.....                   | 6.9                          | 1.7              | 40.3             | 30.7                        | 13.9     | 6.5                |
| 13. Lehigh University.....                     | 6.2                          |                  | 32.9             | 34.2                        | 21.2     | 5.5                |
| 14. Louisiana State University.....            | 15.0                         |                  | 40.1             | 21.1                        | 17.0     | 6.8                |
| 15. Maine University.....                      | 4.5                          |                  | 30.8             | 41.6                        | 18.6     | 4.5                |
| 16. Manhattan College.....                     | 9.5                          |                  | 24.4             | 44.0                        | 22.0     |                    |
| 17. Massachusetts Institute of Technology..... | 11.8                         |                  | 24.1             | 45.1                        | 13.8     | 5.2                |
| 18. Michigan State College.....                | 15.0                         |                  | 29.0             | 32.2                        | 16.8     | 7.0                |
| 19. Michigan University.....                   | 11.0                         |                  | 30.6             | 42.4                        | 13.1     | 2.9                |
| 20. Minnesota University.....                  | 8.2                          | 1.8              | 24.7             | 41.7                        | 22.9     | 0.7                |
| 21. Newark College of Engineering.....         | 6.4                          |                  | 27.9             | 37.8                        | 27.9     |                    |
| 22. New York University.....                   | 9.2                          |                  | 22.9             | 41.1                        | 21.6     | 5.2                |
| 23. North Carolina State College.....          | 9.6                          |                  | 26.4             | 33.9                        | 22.6     | 7.5                |
| 26. Oregon State College.....                  | 5.8                          |                  | 21.7             | 43.0                        | 15.0     | 14.5               |
| 27. Pennsylvania State College.....            | 13.8                         |                  | 31.7             | 29.7                        | 17.9     | 6.9                |
| 28. Purdue University.....                     | 8.3                          |                  | 25.5             | 39.0                        | 18.7     | 8.5                |
| 29. Rutgers University.....                    | 12.9                         |                  | 33.7             | 35.6                        | 12.9     | 4.9                |
| 30. Santa Clara University.....                | 9.3                          |                  | 27.9             | 42.1                        | 16.4     | 4.3                |
| 32. Texas A. & M. College.....                 | 13.3                         |                  | 26.6             | 39.3                        | 18.4     | 2.5                |
| 33. Texas University.....                      | 5.5                          |                  | 40.4             | 33.6                        | 20.5     |                    |
| 34. Washington State College.....              | 3.7                          |                  | 27.3             | 49.0                        | 13.3     | 6.7                |
| 35. Washington University.....                 | 7.0                          | 1.5              | 23.5             | 44.5                        | 14.5     | 9.0                |
| 36. West Virginia University.....              | 9.7                          |                  | 29.2             | 45.5                        | 9.1      | 6.5                |
| 37. Wisconsin University.....                  | 11.2                         |                  | 28.3             | 54.0                        | 6.6      |                    |
| Average.....                                   | 9.4                          | 0.3              | 29.7             | 39.5                        | 16.3     | 4.8                |

\*All pure science subjects included here. See table 1 for pure science subjects.

**Table 3. Percentage of time allocated to various groups of subjects—sanitary engineering (b)**

| School   | Sanitary<br>engi-<br>neering* | Public<br>health | Pure<br>science | General<br>engi-<br>neering | Cultural | Miscel-<br>laneous |
|--|-------------------------------|------------------|-----------------|-----------------------------|----------|--------------------|
| 1. Alabama University.....                     | 10.3                          | 2.1              | 26.5            | 35.5                        | 23.1     | 2.6                |
| 2. California University.....                  | 20.0                          |                  | 27.5            | 39.3                        | 7.4      | 5.9                |
| 6. Georgia Institute of Technology.....        | 18.5                          |                  | 26.4            | 33.1                        | 14.5     | 7.4                |
| 8. Illinois University.....                    | 18.1                          |                  | 26.4            | 44.4                        | 5.6      | 5.6                |
| 9. Iowa State University.....                  | 11.0                          |                  | 26.2            | 48.3                        | 11.7     | 2.8                |
| 11. Kansas University.....                     | 12.1                          | 1.4              | 27.6            | 44.0                        | 14.9     |                    |
| 12. Kentucky University.....                   | 22.5                          | 1.7              | 24.7            | 30.7                        | 13.9     | 6.5                |
| 13. Lehigh University.....                     | 15.1                          |                  | 24.0            | 34.2                        | 21.2     | 5.5                |
| 14. Louisiana State University.....            | 32.0                          |                  | 23.1            | 21.1                        | 17.0     | 6.8                |
| 15. Maine University.....                      | 10.9                          |                  | 24.5            | 41.6                        | 18.6     | 4.5                |
| 16. Manhattan College.....                     | 11.3                          |                  | 22.6            | 44.0                        | 22.0     |                    |
| 17. Massachusetts Institute of Technology..... | 11.8                          |                  | 24.1            | 45.1                        | 13.8     | 5.2                |
| 18. Michigan State College.....                | 21.5                          |                  | 22.4            | 32.3                        | 16.8     | 7.0                |
| 19. Michigan University.....                   | 13.9                          |                  | 27.8            | 42.4                        | 13.1     | 2.9                |
| 20. Minnesota University.....                  | 11.4                          | 1.8              | 21.4            | 41.7                        | 22.9     | 0.7                |
| 21. Newark College of Engineering.....         | 8.7                           |                  | 25.6            | 37.8                        | 27.9     |                    |
| 22. New York University.....                   | 9.2                           |                  | 22.9            | 41.1                        | 21.6     | 5.2                |
| 23. North Carolina State College.....          | 12.1                          |                  | 23.8            | 33.9                        | 22.6     | 7.5                |
| 26. Oregon State College.....                  | 7.2                           |                  | 20.3            | 43.0                        | 15.0     | 14.5               |
| 27. Pennsylvania State College.....            | 18.6                          |                  | 26.9            | 29.7                        | 17.9     | 6.9                |
| 28. Purdue University.....                     | 10.8                          |                  | 23.0            | 39.0                        | 18.7     | 8.5                |
| 29. Rutgers University.....                    | 24.5                          |                  | 22.1            | 35.6                        | 12.9     | 4.9                |
| 30. Santa Clara University.....                | 9.3                           |                  | 27.9            | 42.1                        | 16.4     | 4.3                |
| 32. Texas A. & M. College.....                 | 15.2                          |                  | 24.6            | 39.3                        | 18.4     | 2.5                |
| 33. Texas University.....                      | 20.5                          |                  | 25.4            | 33.6                        | 20.5     |                    |
| 34. Washington State College.....              | 6.7                           |                  | 24.3            | 49.0                        | 13.3     | 6.7                |
| 35. Washington University.....                 | 7.0                           | 1.5              | 23.5            | 44.5                        | 14.5     | 9.0                |
| 36. West Virginia University.....              | 11.7                          |                  | 27.3            | 45.5                        | 9.1      | 6.5                |
| 37. Wisconsin University.....                  | 13.8                          |                  | 25.7            | 54.0                        | 6.6      |                    |
| Average.....                                   | 14.3                          | 0.3              | 24.8            | 39.5                        | 16.3     | 4.8                |

\*Sanitary engineering includes pure science subjects such as bacteriology, biology, all chemistry beyond freshmen chemistry, etc.

Table 4. *Percentage of time allocated to various groups of subjects—civil engineering curriculum*

| School  | Sanitary engineering | Pure science | General engineering | Cultural | Miscellaneous |
|---|----------------------|--------------|---------------------|----------|---------------|
| 1. Alabama University <sup>1</sup> .....            | 2.2                  | 25.9         | 44.8                | 24.5     | 2.6           |
| 2. California University <sup>1</sup> .....         | 2.9                  | 27.2         | 60.3                | 3.7      | 5.9           |
| 3. Case Institute of Technology <sup>2</sup> .....  | 5.2                  | 25.8         | 45.4                | 19.0     | 4.6           |
| 4. Colorado State College.....                      | 4.2                  | 24.1         | 42.1                | 24.1     | 5.6           |
| 5. Cornell University <sup>2</sup> .....            | 4.9                  | 20.5         | 51.9                | 22.7     | .....         |
| 8. Illinois University.....                         | 4.9                  | 26.6         | 55.2                | 7.7      | 5.6           |
| 9. Iowa State University.....                       | 4.9                  | 28.9         | 51.4                | 12.0     | 2.8           |
| 11. Kansas University.....                          | 3.6                  | 27.8         | 55.7                | .....    | .....         |
| 12. Kentucky University.....                        | 4.3                  | 28.3         | 47.6                | 13.3     | 6.4           |
| 13. Lehigh University.....                          | 4.1                  | 24.0         | 45.9                | 20.6     | 5.5           |
| 14. Louisiana State University.....                 | 4.1                  | 23.8         | 50.2                | 15.0     | 6.8           |
| 17. Massachusetts Institute of Technology.....      | 2.6                  | 25.8         | 52.7                | 13.8     | 5.2           |
| 18. Michigan State College <sup>2</sup> .....       | 3.3                  | 22.0         | 51.0                | 16.8     | 7.0           |
| 20. Minnesota University.....                       | 2.2                  | 25.1         | 47.6                | 24.4     | 0.7           |
| 21. Newark College of Engineering.....              | 3.6                  | 28.4         | 41.5                | 26.6     | .....         |
| 22. New York University.....                        | 5.3                  | 23.2         | 44.4                | 21.8     | 5.3           |
| 23. North Carolina State College <sup>2</sup> ..... | 3.3                  | 25.1         | 40.7                | 23.4     | 7.4           |
| 25. Oklahoma A. & M. College <sup>2</sup> .....     | 6.1                  | 28.4         | 46.7                | 13.5     | 5.4           |
| 26. Oregon State College <sup>2</sup> .....         | 1.4                  | 20.3         | 49.3                | 14.5     | 14.5          |
| 28. Purdue University.....                          | 2.7                  | 23.0         | 49.0                | 16.8     | 8.5           |
| 30. Santa Clara University <sup>2</sup> .....       | 2.9                  | 27.9         | 48.5                | 16.4     | 4.3           |
| 32. Texas A. & M. College.....                      | 3.8                  | 24.7         | 52.6                | 16.4     | 2.5           |
| 34. Washington State College.....                   | 3.7                  | 27.3         | 49.0                | 13.3     | 6.7           |
| 36. West Virginia University.....                   | 4.5                  | 29.2         | 50.6                | 9.1      | 6.5           |
| 37. Wisconsin University.....                       | 3.3                  | 25.7         | 64.6                | 6.6      | .....         |
| Average.....  | 3.8                  | 25.6         | 49.5                | 16.4     | 4.8           |

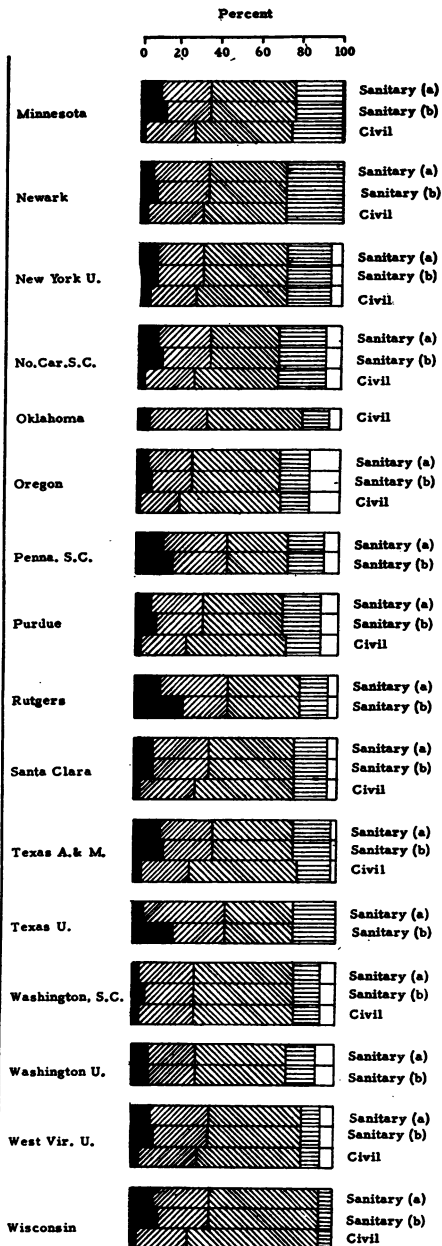
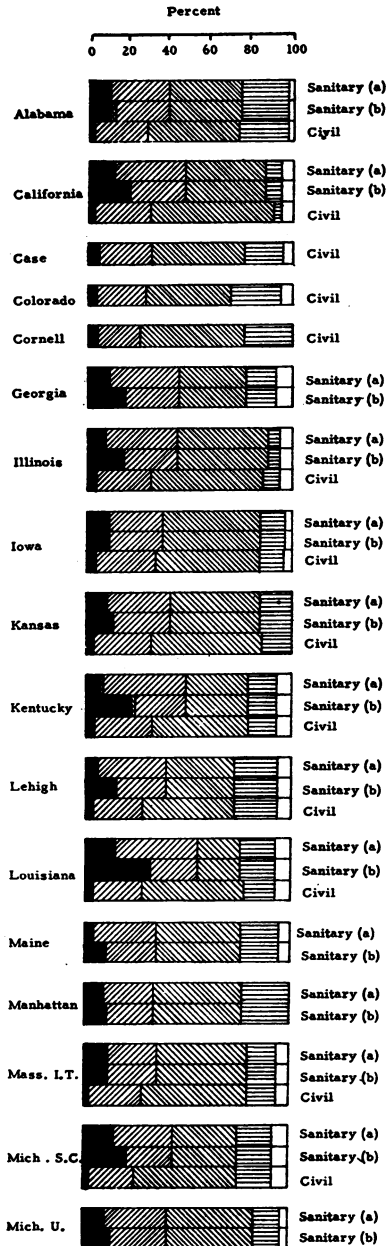
<sup>1</sup> Construction option.<sup>2</sup> 1946-47 data.<sup>3</sup> Structural option.

and the others remain the same. The maximum and minimum values in the pure science category show a relatively small range indicating that, in general, the time allotted to this field of subjects is about equal at all institutions (21 to 28 percent). As before, wide differences are noted in the other categories, and the median and mean, or average values, are approximately equal.

*Civil engineering.* The percent of time allocated to each of the groups of subjects was as follows:

| Group                     | Percent of Time Allocated |         |         |        |
|---------------------------|---------------------------|---------|---------|--------|
|                           | Average                   | Maximum | Minimum | Median |
| Sanitary engineering..... | 3.8                       | 6.1     | 1.4     | 3.7    |
| Pure science.....         | 25.6                      | 29.2    | 20.3    | 25.8   |
| General engineering.....  | 49.5                      | 64.6    | 40.7    | 49.0   |
| Cultural.....             | 16.4                      | 26.6    | 3.7     | 16.4   |
| Miscellaneous.....        | 4.8                       | 14.5    | 0       | 5.4    |

Approximately 4 percent of the time allotted in civil engineering curricula is devoted to a study of sanitary engineering subjects. These include primarily water supply and sewerage and sanitary engineering design. Of the remaining time, about 25 percent is assigned to pure science subjects, 50 percent to general engineering subjects, 16 percent to cultural subjects, and 5 percent to miscellaneous subjects. The range in maximum and minimum values is rather large in some instances as indicated by the tabulated values.



Sanitary Engineering

Public Health

Pure Science

General Engineering

Cultural

Miscellaneous

Sanitary (a) - Straight Sanitary  
Sanitary (b) - Includes certain Pure  
Science Subjects. See Text  
Civil - - - - - Straight Civil

Bar diagram shows percent of time allocated to the groups of subjects: sanitary engineering, public health, pure science, general engineering, cultural, and miscellaneous. Comparisons are made with civil engineering courses.

A study of the 29 undergraduate sanitary engineering curricula listed indicates that courses in bacteriology are required at 20 institutions, in biology at 8, some form of sanitary chemistry at 10, sanitary engineering laboratory at 11, industrial wastes at 1, stream pollution at 1, and public health engineering or sanitary engineering at 13 institutions. These data indicate that there appears to be wide diversity of opinion as to what courses should be offered in sanitary engineering.

It is interesting to note the changes that have occurred in the last few years in the percentage of time allocated to the various groups of subjects when compared with similar data in the earlier reports (1, 2, 3). There appears to be a slight decrease in the percent of time devoted to sanitary engineering during the past 20 years, a decrease in public health and general engineering, and an increase in pure science and cultural subjects. The time allotted to cultural subjects has increased substantially since 1936-37. This trend is in line with the recommendation made by the American Society for Engineering Education Committee (6), "Introduction of a carefully planned and integrated stem of humanistic-social courses which would take about 20 percent of the students' time . . ."

| Group                     | Average Percentages of Time Allotted to<br>Subject Groups |         |          |       |
|---------------------------|---|---------|----------|-------|
|                           | 1946-49   | 1946-47 | 1936-37* | 1929* |
| Sanitary engineering----- | 9. 4  | 10. 3   | 10. 3    | 12. 1 |
| Public health-----        | 0. 3  | 0. 3    | 1. 2     | 0. 7  |
| Pure science-----         | 29. 7   | 30. 4   | 28. 3    | 26. 9 |
| General engineering-----  | 39. 5   | 38. 7   | 44. 5    | 43. 5 |
| Cultural-----             | 16. 3   | 16. 1   | 9. 5     | 14. 2 |
| Miscellaneous-----        | 4. 8  | 4. 3    | 6. 1     | 2. 7  |

\*Data taken from reference 3.

Included in appendix II for purposes of comparison is a sanitary engineering curriculum of study proposed by Alexander Szniolis (?) for use in Polish technological institutions.

### Degrees Offered

A variety of degrees are offered to under graduate students completing the courses in sanitary engineering.<sup>2</sup> A total of fifteen different degrees is offered by the 29 institutions listed in table 1.

<sup>2</sup> The author has compiled information on the undergraduate courses offered in sanitary engineering at the several engineering colleges in the United States. A compilation is available without charge on request to the Public Health Service, Bureau of State Services, Washington 25, D. C.

## Summary

Information on undergraduate sanitary engineering curricula at 29 American educational institutions is presented, and time allotted to groups of subjects is compared with that allocated to similar groups of subjects included in civil engineering curricula.

## ACKNOWLEDGMENT

The author is very grateful to the college and university authorities and to the many professors who contributed their time to reply to the various inquiries.

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## APPENDIX I

The following, taken from "Employment Opportunities in Public Health" (4), are institutions offering courses in sanitary engineering or sanitary engineering option of civil engineering, which have requested and have been accredited by the Engineers' Council for Professional Development:

|                                       |  |
|---------------------------------------|--|
| University of California              | Michigan State College                       |
| Case School of Applied Science        | University of Michigan                       |
| Colorado State College                | New York University                          |
| Cornell University                    | North Carolina State College                 |
| Harvard University                    | Oklahoma Agricultural and Mechanical College |
| University of Illinois                | Pennsylvania State College                   |
| State University of Iowa              | Purdue University                            |
| University of Kansas                  | Rutgers University                           |
| University of Kentucky                | Santa Clara University                       |
| Lehigh University                     | University of Texas                          |
| Louisiana State University            | State College of Washington                  |
| University of Maine                   | West Virginia University                     |
| Manhattan College                     | University of Wisconsin                      |
| Massachusetts Institute of Technology |  |

Partial list of other institutions offering instruction in sanitary engineering and public health engineering, in undergraduate option or as a graduate major, or both:

|                                 |   |
|---------------------------------|---|
| University of Alabama           | Oregon State University                   |
| Georgia Institute of Technology | Stanford University                       |
| Johns Hopkins University        | Texas Agricultural and Mechanical College |
| University of Minnesota         | Washington University                     |
| University of North Carolina    |   |

A somewhat similar tabulation appeared in "Engineers' Council for Professional Development" (5).

Accredited Sanitary Engineering Curricula:

|                                       |                            |
|---------------------------------------|----------------------------|
| Harvard University <sup>1</sup>       | Pennsylvania State College |
| Massachusetts Institute of Technology | Rutgers University         |

Options as part of other accredited curricula noted:

|                                |  |
|--------------------------------|--|
| University of California       | Michigan State College                       |
| Case School of Applied Science | University of Michigan                       |
| Colorado State College         | New York University <sup>2</sup>             |
| Cornell University             | North Carolina State College                 |
| University of Illinois         | Oklahoma Agricultural and Mechanical College |
| State University of Iowa       | Purdue University                            |
| University of Kansas           | University of Santa Clara                    |
| University of Kentucky         | University of Texas                          |
| Lehigh University              | State College of Washington                  |
| Louisiana State University     | West Virginia University                     |
| University of Maine            | University of Wisconsin                      |
| Manhattan College              |  |

<sup>1</sup> Accrediting applies only to curriculum as submitted to ECPD and upon completion of which a certificate is issued by Harvard University certifying that the student has pursued such curriculum.

<sup>2</sup> Accrediting applies to day and night curricula.

## APPENDIX II

Curriculum in sanitary engineering proposed by Szniolis (7) for use in Polish technical schools.

| Subject                         | Hours per week |           |             |          |
|---------------------------------|----------------|-----------|-------------|----------|
|                                 | 1st semester   |           | 2d semester |          |
|                                 | lecture        | lab.      | lecture     | lab.     |
| <i>1st year:</i>                |                |           |             |          |
| Elements of higher mathematics  | 4              | 2         | 4           | 2        |
| Physics                         | 4              | 3         | 3           |          |
| Machine components              |                |           | 2           |          |
| Descriptive geometry            | 3              | 3         |             |          |
| General chemistry               | 5              | 6         | 5           |          |
| General and fluid mechanics     |                |           | 4           | 2        |
| Materials of construction       | 2              |           | 2           | 1        |
| General and engineering geology |                |           | 3           | 1        |
| Drafting (engineering drawing)  |                | 2         |             | 2        |
| General hygiene                 | 3              |           | 3           |          |
| English language                | 2              |           | 2           |          |
| <b>Total</b>                    | <b>23</b>      | <b>16</b> | <b>28</b>   | <b>8</b> |

| Subject  | Hours per week |      |             |      |
|--|----------------|------|-------------|------|
|  | 1st semester   |      | 2d semester |      |
|  | lecture        | lab. | lecture     | lab. |
| <b>2d year:</b>  |                |      |             |      |
| Statistical methods for engineers.....   | 2              | 2    |             |      |
| Physical chemistry.....  |                |      | 3           |      |
| Analytical chemistry.....  | 1              | 15   | 1           | 16   |
| General machinery.....   | 2              |      |             | 2    |
| Strength of materials.....   | 2              | 1    |             |      |
| Structures I.....  |                |      | 4           | 4    |
| Statics.....   |                |      | 4           | 6    |
| Applied hydraulics.....  | 2              | 1    |             |      |
| Regional geology.....  |                |      | 2           | 1    |
| General biology.....   | 3              |      | 3           |      |
| Economics.....   | 3              |      |             |      |
| <b>Total</b> .....   | 15             | 19   | 17          | 29   |
| <b>3d year:</b>  |                |      |             |      |
| General sanitation.....  | 4              |      |             |      |
| Sanitary analysis.....   | 2              | 4    | 2           | 4    |
| Microbiology and parasitology.....   | 2              | 4    | 2           | 4    |
| Hydrogeology and well drilling.....  |                |      | 2           | 2    |
| Water and sewage technology.....   |                |      | 4           |      |
| Technology of industrial processes.....  | 1              |      | 4           |      |
| Electrical engineering.....  | 1              | 2    | 2           | 2    |
| Soil science and melioration in relation to sanitary engineering.....                  | 2              | 2    |             |      |
| Meteorology and climatology.....   |                |      |             | 4    |
| Water supply and sewerage.....   | 4              |      |             | 4    |
| Hydraulic construction.....  | 2              |      |             |      |
| Structures (earthworks, foundations, reinforced concrete, and steel construction)..... | 4              | 3    |             |      |
| Rural construction.....  |                |      | 2           |      |
| <b>Total</b> .....   | 21             | 15   | 20          | 16   |
| <b>4th year:</b>   |                |      |             |      |
| Water and sewage technology.....   | 2              | 4    | 2           | 2    |
| Technology of industrial processes.....  | 4              |      |             |      |
| Industrial hygiene and safety.....   | 2              | 4    | 2           | 2    |
| Sanitation of food industries.....   | 2              |      |             |      |
| Control of disease vectors.....  | 3              | 1    |             |      |
| Air conditioning.....  | 4              | 2    |             |      |
| Industrial waste disposal.....   |                |      | 3           |      |
| Limnology and stream protection.....   | 2              | 1    |             |      |
| Community planning.....  | 1              | 1    |             |      |
| Construction of sanitary facilities.....   | 2              | 2    |             |      |
| Organization and execution of projects.....  |                |      | 2           |      |
| Construction laws and specifications.....  |                |      | 2           |      |
| Public health organization and regulations.....  | 2              |      |             |      |
| Evaluation and design of sanitary facilities.....                                      |                |      | 2           | 4    |
| Thesis.....  |                |      |             | 18   |
| <b>Total</b> .....   | 24             | 15   | 13          | 26   |

For convenience in comparing these data with those given in the body of the report, percentages of time allocated to the various groups of subjects have been computed and are tabulated below.

#### Percent of Time Allotted to Subject Groups

| Sanitary engineering      |      |      | Sanitary engineering     |      |      |
|---------------------------|------|------|--------------------------|------|------|
|                           | (a)  | (b)  |                          | (a)  | (b)  |
| Sanitary engineering..... | 28.3 | 39.7 | General engineering..... | 36.5 | 36.5 |
| Public health.....        | 2.6  | 2.6  | Cultural.....            | 3.0  | 3.0  |
| Pure science.....         | 28.8 | 17.4 | Miscellaneous.....       | 0.9  | 0.9  |

# INCIDENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED OCTOBER 1, 1949

A total of 1,855 cases of poliomyelitis was reported during the current week, as compared with 2,192 last week—a decrease of 337 cases, or approximately 15 percent (decrease last week 16.5 percent, same week last year 4.9 percent). The median figure of the corresponding weeks of the past 5 years is 976. Currently, decreases were reported in all of the 9 geographic divisions. Increases totaling 75 cases (none of more than 13 cases) were reported in 13 States. The 23 States reporting more than 20 cases each are as follows (last week's figures in parentheses): *Increases*—Connecticut 40 (32), Indiana 36 (35), Iowa 56 (44), South Dakota 25 (18), Colorado 36 (33); *decreases*—Massachusetts 82 (143), New York 287 (288), New Jersey 65 (91), Pennsylvania 47 (59), Ohio 105 (125), Illinois 113 (135), Michigan 134 (170), Wisconsin 68 (87), Minnesota 89 (121), Missouri 27 (54), Nebraska 41 (51), Kansas 21 (32), Kentucky 33 (47), Arkansas 25 (26), Oklahoma 40 (43), Texas 67 (90), Washington 36 (44), California 117 (122).

For the year to date (39 weeks) a total of 33,144 cases has been reported, as compared with 19,174 for the same period last year and a 5-year median of 14,546. For the comparable periods of the 6 years 1943–48 (combined), approximately 72 percent of the combined totals for those years was reported.

During the week, 1 case of anthrax was reported in New York. Of 44 cases of infectious encephalitis, in 16 States, South Dakota reported 18, Colorado 5, and Oklahoma 4. Ten cases of Rocky Mountain spotted fever were reported in 8 States.

A total of 8,274 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,444 last week, 8,326 and 8,413, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year 1946–48 median of 8,326. For the year to date the total is 349,332, as compared with 351,511 for the same period last year. Infant deaths totaled 660, last week 703, same week last year 653, 3-year median 667. The cumulative figure is 25,145, same period last year 25,601.

*Telegraphic case reports from State health officers for the week ended Oct. 1, 1949*

[Leaders indicate that no cases were reported]

| Division and State        | Diphtheria | Encephalitis, infectious | Influenza | Measles | Menigitis, meningococcal | Pneumonia | Polio-myelitis | Rocky Mt. spotted fever | Scarlet fever | Small-pox | Tularemia | Typhoid and paratyphoid fever * | Whooping cough | Rabies in animals |
|---------------------------|------------|--------------------------|-----------|---------|--------------------------|-----------|----------------|-------------------------|---------------|-----------|-----------|---------------------------------|----------------|-------------------|
| <b>NEW ENGLAND</b>        |            |                          |           |         |                          |           |                |                         |               |           |           |                                 |                |                   |
| Maine.....                |            |                          |           | 21      |                          | 11        | 17             |                         | 2             |           |           | 3                               | 2              |                   |
| New Hampshire.....        |            |                          |           |         |                          |           | 15             |                         |               |           |           |                                 |                |                   |
| Vermont.....              |            |                          |           | 6       |                          | 1         | 15             |                         |               |           |           |                                 | 3              |                   |
| Massachusetts.....        | 6          | 1                        |           | 12      |                          |           | 82             |                         | 20            |           |           |                                 | 79             |                   |
| Rhode Island.....         |            |                          |           |         |                          |           | 11             |                         | 3             |           |           |                                 | 2              |                   |
| Connecticut.....          |            | 1                        |           | 7       | 2                        | 29        | 40             |                         | 6             |           |           |                                 | 28             |                   |
| <b>MIDDLE ATLANTIC</b>    |            |                          |           |         |                          |           |                |                         |               |           |           |                                 |                |                   |
| New York.....             | 4          |                          | •         | 50      | 5                        | 113       | 287            | 1                       | d 26          |           |           |                                 | 150            | 12                |
| New Jersey.....           |            |                          | •         | 35      |                          | 32        | 65             | 1                       | 12            |           |           |                                 | 127            | 1                 |
| Pennsylvania.....         | 2          | 1                        | •         | 122     | 6                        | 50        | 47             |                         | 21            |           |           |                                 | 168            |                   |
| <b>EAST NORTH CENTRAL</b> |            |                          |           |         |                          |           |                |                         |               |           |           |                                 |                |                   |
| Ohio.....                 | 2          |                          | 2         | 10      | 4                        | 48        | 105            |                         | 63            |           |           |                                 | 76             | 7                 |
| Indiana.....              | 10         |                          | 2         | 1       | 1                        |           | 36             |                         | 14            |           |           |                                 | 7              | 19                |
| Illinois.....             | 1          | 1                        | 2         | 113     | 5                        | 97        | 136            | 1                       | 18            |           | 1         |                                 | 96             | 1                 |
| Michigan.....             | 3          |                          | 1         | 41      |                          | 16        | 134            |                         | 52            |           |           |                                 | 188            | 5                 |
| Wisconsin.....            | 1          |                          | 3         | 38      | 2                        | 6         | 68             |                         | 11            |           |           |                                 | 59             |                   |
| <b>WEST NORTH CENTRAL</b> |            |                          |           |         |                          |           |                |                         |               |           |           |                                 |                |                   |
| Minnesota.....            | 4          | 2                        |           | 12      | 3                        | 28        | 89             |                         | 17            |           |           |                                 | 2              |                   |
| Iowa.....                 |            |                          |           | 3       |                          |           | 56             |                         | 3             |           |           |                                 | 2              | 1                 |
| Missouri.....             | 7          |                          | 1         | 3       |                          | 11        | 27             |                         | 6             |           |           |                                 | 2              |                   |
| North Dakota.....         |            | 2                        | 12        | 4       | 1                        |           | 5              |                         |               |           | 1         |                                 | 3              |                   |
| South Dakota.....         | 1          | 18                       | 1         | 1       | 1                        | 25        | 25             |                         | 4             |           |           |                                 | 1              |                   |
| Nebraska.....             |            | 1                        | 11        | 5       | 1                        | 5         | 41             |                         | 20            |           |           |                                 | 3              |                   |
| Kansas.....               | 2          |                          | 2         | 3       |                          | 15        | 21             |                         | 6             |           |           | 1                               | 18             |                   |
| <b>SOUTH ATLANTIC</b>     |            |                          |           |         |                          |           |                |                         |               |           |           |                                 |                |                   |
| Delaware.....             |            |                          |           |         |                          |           |                |                         |               |           |           |                                 |                |                   |
| Maryland.....             | 6          | 1                        | 5         | 1       | 1                        | 22        | 113            |                         | d 12          |           |           |                                 | 9              |                   |
| District of Columbia..... |            |                          |           | 7       |                          |           | 8              |                         | 3             |           | 1         |                                 | 43             |                   |
| Virginia.....             | 7          |                          |           | 5       |                          | 23        | 15             |                         | 7             |           |           |                                 | 16             |                   |
| West Virginia.....        | 9          |                          | 77        | 10      |                          | 2         | 7              | 2                       | 15            |           |           |                                 | 10             |                   |
| North Carolina.....       | 19         |                          | 10        | 1       | 1                        |           | 14             | 2                       | 50            |           |           |                                 | 14             |                   |
| South Carolina.....       | 10         |                          | 7         | 2       |                          | 12        | 6              |                         | 3             |           |           |                                 | 7              | 6                 |
| Georgia.....              | 11         | 3                        | 6         | 4       | 13                       | 73        | 13             |                         | 19            |           |           |                                 | 7              |                   |
| Florida.....              | 4          |                          | 1         | 9       |                          | 20        | 8              |                         | 1             |           |           |                                 | 7              |                   |

## Telegraphic case reports from State health officers for the week ended Oct. 1, 1949—Continued

| Division and State                      | Diphtheria | Encephalitis, infectious | Influenza | Measles | Meningitis, meningococcal | Pneumonia | Polio-myelitis | Rocky Mt. spotted fever | Scarlet fever | Small-pox | Tularemia | Typhoid and paratyphoid fever <sup>a</sup> | Whooping cough | Rabies in animals |
|---|------------|--------------------------|-----------|---------|---------------------------|-----------|----------------|-------------------------|---------------|-----------|-----------|--|----------------|-------------------|
| <b>EAST SOUTH CENTRAL</b>               |            |                          |           |         |                           |           |                |                         |               |           |           |  |                |                   |
| Kentucky                                | 15         | —                        | —         | —       | 2                         | 14        | 33             | —                       | 46            | —         | —         | 1  | 26             | 9                 |
| Tennessee                               | 10         | —                        | 10        | 14      | —                         | 26        | 13             | —                       | 36            | —         | —         | 5  | 15             | —                 |
| Alabama                                 | 14         | —                        | 4         | 1       | 1                         | 25        | 8              | 1                       | 8             | —         | —         | —  | 5              | 6                 |
| Mississippi <sup>b</sup>                | 12         | —                        | 3         | 6       | —                         | 8         | 10             | —                       | 13            | —         | —         | 4  | 1              | —                 |
| <b>WEST SOUTH CENTRAL</b>               |            |                          |           |         |                           |           |                |                         |               |           |           |  |                |                   |
| Arkansas                                | 4          | —                        | —         | —       | —                         | 12        | 25             | —                       | 5             | —         | —         | —  | 9              | 1                 |
| Louisiana                               | 6          | —                        | —         | 3       | —                         | 7         | 7              | —                       | —             | —         | —         | 3  | —              | —                 |
| Oklahoma                                | 3          | 4                        | 19        | 5       | 3                         | 12        | 40             | 1                       | 6             | —         | —         | 2  | 4              | —                 |
| Texas                                   | 18         | 1                        | 716       | 34      | 4                         | 168       | 67             | —                       | 10            | —         | —         | 4  | 92             | 14                |
| <b>MOUNTAIN</b>                         |            |                          |           |         |                           |           |                |                         |               |           |           |  |                |                   |
| Montana                                 | 1          | —                        | 10        | 22      | —                         | 5         | 12             | —                       | 2             | —         | —         | —  | 3              | —                 |
| Idaho                                   | —          | —                        | —         | 1       | —                         | 6         | 16             | —                       | 4             | —         | —         | —  | 6              | —                 |
| Wyoming                                 | —          | —                        | —         | —       | —                         | —         | —              | —                       | —             | —         | —         | —  | —              | —                 |
| Colorado                                | 2          | 5                        | 23        | 8       | 2                         | 12        | 36             | 1                       | 2             | —         | 2         | 1  | 1              | —                 |
| New Mexico                              | 1          | 1                        | 1         | 3       | —                         | 11        | 7              | —                       | 5             | —         | —         | 5  | 6              | —                 |
| Arizona                                 | —          | —                        | —         | —       | —                         | 9         | 9              | —                       | —             | —         | —         | —  | 9              | —                 |
| Utah <sup>c</sup>                       | —          | 1                        | 1         | 13      | 1                         | 10        | 14             | —                       | 2             | —         | —         | —  | 5              | —                 |
| Nevada                                  | —          | —                        | —         | 14      | —                         | —         | —              | —                       | —             | —         | —         | —  | 12             | —                 |
| <b>PACIFIC</b>                          |            |                          |           |         |                           |           |                |                         |               |           |           |  |                |                   |
| Washington                              | —          | —                        | —         | 14      | —                         | 1         | 36             | —                       | 9             | —         | —         | —  | 21             | —                 |
| Oregon                                  | —          | —                        | 6         | 15      | —                         | 21        | 17             | —                       | 5             | —         | —         | —  | 16             | —                 |
| California                              | 2          | 1                        | 3         | 33      | 4                         | 20        | 117            | —                       | 22            | —         | —         | 12   | 98             | 1                 |
| Total                                   | 197        | 44                       | 1,019     | 509     | 54                        | 969       | 1,855          | 10                      | 601           | —         | 13        | 102  | 1,421          | —                 |
| Median, 1944-48                         | 313        | 28                       | 1,111     | 612     | 64                        | —         | 976            | 10                      | 912           | —         | 14        | 114  | 1,728          | —                 |
| Year to date 39 weeks                   | 5,267      | 577                      | 81,094    | 590,404 | 2,818                     | 60,700    | 133,144        | 531                     | 60,990        | 43        | 918       | 2,912                                      | 46,602         | —                 |
| Median, 1944-48                         | 8,429      | 483                      | 195,844   | 554,446 | 4,799                     | —         | 14,546         | 497                     | 90,904        | 283       | 717       | 3,225                                      | 75,875         | —                 |
| Seasonal low week ends                  | (27th)     | —                        | (30th)    | (35th)  | (37th)                    | —         | (11th)         | —                       | (32nd)        | (35th)    | —         | (11th)                                     | (38th)         | —                 |
| Since seasonal low week                 | July 9     | July 30                  | July 30   | Sept. 3 | Sept. 17                  | —         | Mar. 19        | —                       | Aug. 13       | Sept. 3   | —         | Mar. 19                                    | Oct. 2         | —                 |
| Median, 1944-45 to 1948-49 <sup>b</sup> | 1,499      | —                        | 5,827     | 1,886   | 102                       | —         | 132,228        | —                       | 2,420         | 2         | —         | 2,432                                      | 56,635         | —                 |
|   | 2,713      | —                        | 5,647     | 2,178   | 133                       | —         | 14,283         | —                       | 4,609         | 10        | —         | 2,750                                      | 102,319        | —                 |

<sup>a</sup> Period ended earlier than Saturday.<sup>b</sup> The median of the 5 preceding corresponding periods; for whooping cough, the corresponding periods are 1943-44 to 1947-48.<sup>c</sup> New York City and Philadelphia only, respectively.<sup>d</sup> Including cases reported as streptococcal infection and septic sore throat.<sup>e</sup> Including paratyphoid fever currently reported separately as follows: Virginia 1, Georgia 2, Florida 1, Tennessee 2, Texas 1, Wyoming 1, California 9.<sup>f</sup> monella infections included in the table were as follows: Massachusetts 3, New York 4.<sup>g</sup> Polio-myelitis: Delayed report, Maryland; August onset 2 cases; deductions, Michigan, weeks ended August 20, and September 10, 1 case each.<sup>h</sup> Typhoid fever: Deduction, North Carolina, week ended July 30, 1 case.<sup>i</sup> Anthrax: New York 1 case.<sup>j</sup> Alaska: Septic sore throat 16.<sup>k</sup> Hawaii Territory: Measles 5, lobar pneumonia 1.

## FOREIGN REPORTS

### CANADA

*Provinces—Notifiable diseases—Week ended September 10, 1949.*—During the week ended September 10, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

| Disease                            | New-found-land | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Total |
|------------------------------------|----------------|----------------------|-------------|---------------|--------|---------|----------|--------------|---------|------------------|-------|
| Chickenpox.....                    |                |                      | 9           |               | 23     | 32      | 6        | 10           | 18      | 11               | 109   |
| Diphtheria.....                    |                |                      | 1           |               | 6      |         |          |              |         | 1                | 8     |
| Dysentery:                         |                |                      |             |               |        |         |          | 4            |         |                  | 4     |
| Amoebic.....                       |                |                      |             |               |        |         |          |              |         |                  | 1     |
| Bacillary.....                     |                |                      |             |               | 1      |         |          |              |         |                  | 1     |
| Encephalitis, infectious.....      |                |                      |             |               |        |         | 2        |              | 1       |                  | 3     |
| German measles.....                |                |                      | 1           |               | 1      | 5       |          |              | 5       | 1                | 13    |
| Influenza.....                     |                |                      | 25          |               |        | 2       | 1        |              |         |                  | 28    |
| Measles.....                       |                |                      | 12          |               | 28     | 33      | 14       | 89           | 14      | 46               | 236   |
| Meningitis, meningococcal.....     |                |                      |             | 1             | 2      |         | 1        |              |         |                  | 4     |
| Mumps.....                         |                |                      | 10          |               | 3      | 36      | 3        | 21           | 5       | 31               | 109   |
| Polio-myelitis.....                | 2              |                      | 8           | 3             | 34     | 81      | 13       | 16           | 10      | 15               | 182   |
| Scarlet fever.....                 | 2              |                      | 1           |               | 23     | 10      | 3        | 6            | 10      |                  | 55    |
| Tuberculosis (all forms).....      |                |                      | 2           | 6             | 75     | 22      | 14       | 14           |         | 52               | 185   |
| Typhoid and paratyphoid fever..... |                |                      |             |               | 7      | 2       | 1        |              |         | 5                | 15    |
| Undulant fever.....                |                |                      |             |               | 1      | 3       | 1        |              |         |                  | 5     |
| Veneral diseases:                  |                |                      |             |               |        |         |          |              |         |                  |       |
| Gonorrhoea.....                    | 6              | 6                    | 14          | 14            | 100    | 59      | 25       | 6            | 34      |                  | 264   |
| Syphilis.....                      | 3              | 2                    | 5           | 16            | 38     | 22      | 3        | 6            | 4       |                  | 99    |
| Whooping cough.....                |                |                      |             | 1             | 73     | 61      | 6        | 5            | 1       | 4                | 151   |

### GERMANY

*Typhoid fever.*—Information received through the American Consulate at Bremen, Germany, dated September 12, 1949, states that 169 cases of typhoid fever have been reported in the town of Dueren in the Rhineland. On August 31, 1949, approximately 230 cases were reported in the town of Krefeld, which is located about 13 miles from the city of Dusseldorf. Local doctors in the town of Waldbroel, near Gummersbach, state that there is an epidemic of typhoid fever in that town also.

## JAPAN

*Notifiable diseases—4 weeks ended August 27, 1949, and accumulated totals for the year to date.*—For the 4 weeks ended August 27, 1949, and for the year to date, certain notifiable diseases were reported in Japan as follows:

| Disease                         | 4 weeks ended<br>Aug. 27, 1949 |        | Total reported for<br>the year to date |        |
|---------------------------------|--------------------------------|--------|--|--------|
|                                 | Cases                          | Deaths | Cases                                  | Deaths |
| Diphtheria.....                 | 543                            | 43     | 9,859                                  | 996    |
| Dysentery, unspecified.....     | 7,039                          | 1,898  | 14,565                                 | 4,019  |
| Encephalitis, Japanese "B"..... | 75                             | 20     | 91                                     | 29     |
| Gonorrhea.....                  | 13,101                         | -----  | 123,507                                | -----  |
| Influenza.....                  | 47                             | -----  | 1,824                                  | -----  |
| Malaria.....                    | 507                            | 5      | 2,974                                  | 40     |
| Measles.....                    | 6,851                          | -----  | 154,401                                | -----  |
| Meningitis, epidemic.....       | 102                            | 31     | 1,010                                  | 289    |
| Paratyphoid fever.....          | 302                            | 10     | 1,542                                  | 63     |
| Pneumonia.....                  | 4,420                          | -----  | 104,850                                | -----  |
| Scarlet fever.....              | 208                            | 7      | 3,202                                  | 49     |
| Smallpox.....                   | -----                          | -----  | 120                                    | 12     |
| Syphilis.....                   | 11,864                         | -----  | 132,999                                | -----  |
| Tuberculosis.....               | 37,270                         | -----  | 313,846                                | -----  |
| Typhoid fever.....              | 865                            | 115    | 4,173                                  | 507    |
| Typhus fever.....               | -----                          | -----  | 91                                     | 6      |
| Whooping cough.....             | 17,720                         | -----  | 85,832                                 | -----  |

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

## KOREA

*Encephalitis.*—According to information dated September 22, 1949, incidence of encephalitis in Seoul, Korea, has dropped to a small figure, but is still high in surrounding Kyunggi Province. During the period September 19–21, 48 cases with 1 death were reported in Seoul, 130 cases, 65 deaths in Kyunggi Province. Definite reports from other areas were not available.

## NORWAY

*Notifiable diseases—June 1949.*—During the Month of June 1949, cases of certain notifiable diseases were reported in Norway as follows:

| Disease                       | Cases | Disease                       | Cases |
|-------------------------------|-------|-------------------------------|-------|
| Cerebrospinal meningitis..... | 12    | Measles.....                  | 2,221 |
| Diphtheria.....               | 27    | Mumps.....                    | 436   |
| Dysentery, unspecified.....   | 11    | Paratyphoid fever.....        | 7     |
| Encephalitis, epidemic.....   | 1     | Pneumonia (all forms).....    | 2,168 |
| Erysipelas.....               | 335   | Poliomyelitis.....            | 3     |
| Gastroenteritis.....          | 3,722 | Rheumatic fever.....          | 112   |
| Gonorrhea.....                | 294   | Scabies.....                  | 1,160 |
| Hepatitis, epidemic.....      | 124   | Scarlet fever.....            | 481   |
| Impetigo contagiosa.....      | 1,913 | Syphilis.....                 | 69    |
| Influenza.....                | 2,079 | Tuberculosis (all forms)..... | 409   |
| Laryngitis.....               | 9,351 | Whooping cough.....           | 5,015 |
| Malaria.....                  | 1     |                               |       |

## SWITZERLAND

*Notifiable diseases—April—June 1949.*—During the months of April, May, and June 1949, cases of certain notifiable diseases were reported in Switzerland as follows:

| Disease                       | April | May | June  |
|-------------------------------|-------|-----|-------|
| Cerebrospinal meningitis..... | 4     | 7   | 10    |
| Chickenpox.....               | 193   | 255 | 363   |
| Diphtheria.....               | 53    | 106 | 77    |
| Dysentery.....                | 1     | 2   | 9     |
| Encephalitis, lethargic.....  | 19    | 20  | 33    |
| Hepatitis, epidemic.....      | 323   | 50  | 13    |
| Influenza.....                | 891   | 939 | 2     |
| Malaria.....                  | 256   | 198 | 1,216 |
| Measles.....                  | 4     | 11  | 327   |
| Mumps.....                    | 5     | 12  | 3     |
| Paratyphoid fever.....        | 4     | 11  | 34    |
| Poliomylitis.....             | 588   | 491 | 837   |
| Scarlet fever.....            | 341   | 315 | 377   |
| Tuberculosis.....             | 2     | 5   | 3     |
| Typhoid fever.....            | 14    | 24  | 18    |
| Undulant fever.....           | 474   | 634 | 695   |
| Whooping cough.....           |       |     |       |

#### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Plague

*China—Manchuria.*—According to information received from Peiping, dated September 15, 1949, a telegram to Tientsin Municipal Health Bureau from North China People's Government Health Department, dated September 10, stated that plague had appeared in Liao Si, Ssu Ping Kai, Chang Tu, and other places in Manchuria. No figures were given in the report.

*Java—Jogjakarta Residency.*—During the period August 20–September 10, 1949, 75 fatal cases of plague were reported in Jogjakarta Residency, Java. During the week ended September 17, 4 fatal cases were reported in the city of Jogjakarta.

*Madagascar.*—During the period September 1–10, 1949, 15 fatal cases of plague were reported in Madagascar.

*Union of South Africa—Cape Province.*—During the week ended September 17, 1949, plague was reported in Hay District, Cape Province, Union of South Africa, as follows: 2 fatal cases (pneumonic) at Grove Farm, 3 suspected cases at Sterkfontein Farm.

#### Smallpox

*Netherlands Indies—Java.*—Smallpox has been reported in cities in Java as follows: Batavia, week ended September 10, 1949, 197

cases, 38 deaths, week ended September 17, 189 cases, 32 deaths; Bandoeng, week ended August 20, 84 cases, 19 deaths; Cheribon, week ended August 20, 91 cases, 33 deaths; Semarang, week ended August 27, 161 cases, 25 deaths, week ended September 3, 95 cases, 18 deaths, week ended September 10, 49 cases, 7 deaths, week ended September 17, 30 cases, 1 death.

The following information as to press reports dealing with the smallpox epidemic in Batavia and other parts of Java has been received from Batavia: Under date of August 12, 1949, it is stated that according to an article appearing in a local newspaper, 5,358 cases of smallpox (1,790 of which were said to have been fatal) had been reported in Batavia and neighboring areas since January, and an additional 1,469 cases, with 149 deaths, had been reported in the surrounding countryside; further information, dated September 6, quotes a news article which appeared on August 30, in a local newspaper as stating that the Pasundan Health Department had reported 10,000 cases registered in Pasundan. The report said that on August 10, 9,486 cases had been registered, including 365 cases in the city of Bandoeng.

*Nigeria*.—During the period June 19–July 30, 1949, 761 cases of smallpox with 126 deaths were reported in Nigeria.

## DEATHS DURING WEEKS ENDED SEPT. 24 AND OCT. 1, 1949

[From the Weekly Mortality Index, Issued by the National Office of Vital Statistics]

|  | Week ended<br>Sept. 24,<br>1949 | Correspond-<br>ing week,<br>1948 | Week ended<br>Oct. 1,<br>1949 | Correspond-<br>ing week,<br>1948 |
|--|---------------------------------|----------------------------------|-------------------------------|----------------------------------|
| <b>Data for 94 large cities of the United States: <sup>1</sup></b>               |                                 |                                  |                               |                                  |
| Total deaths.....  | 8,640                           | 8,079                            | 8,274                         | 8,326                            |
| Median for 3 prior years.....  | 8,201                           | -----                            | 8,326                         | -----                            |
| Total deaths, first 38 and 39 weeks of year.....                                 | 349,323                         | 351,463                          | 349,332                       | 351,511                          |
| Deaths under 1 year of age.....  | 709                             | 651                              | 660                           | 653                              |
| Median for 3 prior years.....  | 651                             | -----                            | 667                           | -----                            |
| Deaths under 1 year of age, first 38 and 39 weeks of year.....                   | 24,857                          | 25,448                           | 25,145                        | 25,601                           |
| <b>Data from industrial insurance companies:</b>                                 |                                 |                                  |                               |                                  |
| Policies in force.....   | 70,247,170                      | 70,885,689                       | 70,125,164                    | 70,860,825                       |
| Number of death claims.....  | 11,448                          | 12,120                           | 11,827                        | 11,156                           |
| Death claims for 1,000 policies in force, annual rate.....                       | 8.5                             | 8.9                              | 8.8                           | 8.2                              |
| Death claims per 1,000 policies, first 38 and 39 weeks of year, annual rate..... | 9.2                             | 9.4                              | 9.2                           | 9.4                              |

<sup>1</sup> 93 cities for week ended Oct. 1, 1949.